Parkinson's Disease

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Chapter 2

Study design and patient population

Study patient recruitment

All patients were recruited from our outpatients' Movement Disorder Unit of the University Medical Center Groningen (UMCG) between 1999 and 2003. All patients were selected from an existing population of PD patients, who on clinical criteria already were selected for bilateral DBS of the STN (or thalamus-DBS, see *chapter 4*). In 2004 the study results concerning PD progression after STN-DBS (see *chapter 5*) were combined with the study data of the Medical University of Cologne (dr. R. Hilker).
Patients eligible for functional stereotactic surgery had to satisfy the following preoperative inclusion criteria, according to the Core Assessment Program for Surgical Interventional Therapies in Parkinson's Disease (CAPSIT-PD; Defer et al, 1999):

1. Preoperative dopaminergic responsiveness confirmed by a pharmacological test (levodopa "challenge") which should induce at least a 30 % decrease in the Unified Parkinson's Disease Rating Scale (UPDRS) part III score
2. At least bradykinesia or resting tremor as a prominent clinical sign
3. No depression (Montgomery and Asberg Depression Rating Scale, score < 19) or recent psychiatric illness
4. No dementia (Mattis Dementia Rating Scale, score > 130)

Exclusion criteria were:

- Abnormalities on cerebral Magnetic Resonance Imaging (MRI) suggestive of atypical parkinsonism, nor prominent cortical atrophy or extensive white matter lesions
- Any clinical suggestion of atypical parkinsonism (e.g. Progressive Supranuclear Palsy, Multiple System Atrophy)
- Parkinsonism due to trauma, brain tumour, cerebrovascular disease, or due to the intake of anti-dopaminergic drugs or other known chemicals or toxins

Neurosurgical and clinical procedure

In all patients stereotactic surgery was performed by the same neurosurgeon following protocollar procedures. All peroperative semi-micro electrode recording was performed by the same neurophysiologist. All peroperative- and postoperative clinical assessments and DBS adjustments were performed by the neurologists involved in the studies.

Diagnostic evaluation and collection of clinical data

All patients were clinically evaluated during a short hospitalisation at the Neurology Department, according to the CAPSIT-PD recommendations and time schedule: 3-6 months before planned stereotactic surgery, and 6, 12 and (for a smaller part of the study population) 24 months after surgery.

Motor assessment

The following assessments were obtained in the medication-off / medication-on condition, and in stimulator-on condition after surgery, and presented in the studies:

1 *Unified Parkinson's Disease Rating Scale part III (Motor Examination)* (see ***appendix 1***)
2 *Modified Hoehn & Yahr Staging* (see ***appendix 2***)
3 *Schwab and England Activities of Daily Living Scale* (see ***appendix 3***)
4 *Clinical Dyskinesia Rating Scale* (see ***appendix 4***)

All patients (and family members or caretakers) were instructed in the identification of the 4 different patient diary motor states.

Neuropsychological assessment

All tests were performed in the medication-on condition, and in stimulator-on condition after surgery, at the UMCG Neuropsychological Department. Assessments were performed according to CAPSIT-PD recommendations. They consisted of:

1 *Montgomery and Asberg Depression Rating Scale*
2 *Mattis Dementia Rating Scale*
3 *Dutch Adult Reading Test*
4 *Groningen Intelligence Test*
5 *Alternating Category Fluency*
6 *Alternating Letter Fluency*
7 *Boston Naming Test*
8 *Dutch Verbal Learning Test*
9 *Trailmaking Test*
10 *Stroop Color Word Test*
11 *Odd Man Out Test*
12 *Paced Auditory Serial Addition Task 3.2 and 2.8*

In addition, both the patient and a close relative completed questionnaires on memory complaints and cognitive dysexecutive problems.

PET Assessment

FDOPA-PET data acquisition was performed at the UMCG PET Center at (approximately) 3-6 months before planned surgery (baseline PET), and follow-up scans were performed 12-24 months after surgery in the stimulator (DBS)-on condition, following a "stereotactic" scanning protocol. PET data analysis was performed by the same rater, who was unaware of the clinical condition of all patients, and following a standardised protocol.